By (4),

$$\int_0^\infty \frac{x^{a-1}}{1+x}dx = \frac{\pi}{\sin \pi a}.$$

$$\int_0^\infty \frac{e^{-y}}{y^a}dy = \int_0^\infty y^{-a}e^{-y}dy = \int_0^\infty y^{(1-a)-1}e^{-y}dy = \Gamma(1-a).$$

$$\therefore \quad \Gamma(a)\Gamma(1-a) = \frac{\pi}{\sin \pi a},$$

and

$$\Gamma(1+a)\Gamma(1-a) = \frac{\pi a}{\sin \pi a}.$$

Also solved by T. M. BLAKSLEE, C. N. SCHMALL, A. M. HARDING, A. L. MCCARTY, and J. W. CLAWSON.

355. Proposed by C. N. SCHMALL, New York City.

Given the curve of the nth degree,

$$y^n - (a+bx)y^{n-1} + (c+dx+ex^2)y^{n-2} + \cdots = 0,$$

show that if each ordinate is divided by the corresponding subtangent, the sum of all the resulting ratios will be a constant.

SOLUTION BY J. W. CLAWSON, Collegeville, Pa.

The question should read: "show that if for a given abscissa each ordinate . . . ."

The sum of all the ordinates corresponding to a given abscissa x_1 is equal to minus the coefficient of y^{n-1}, viz., $+ (a + bx_1)$.

Hence, the sum of the derivatives of the several ordinates will be $+ b$.

But each subtangent is the ordinate divided by the slope of the curve at the top of the ordinate. Hence any ordinate divided by its corresponding subtangent is equal to the slope of the curve at the top of that ordinate. We have just shown that the sum of these slopes for all the ordinates corresponding to a given abscissa is a constant. This proves the problem, as amended. See EDWARDS' *Differential Calculus*, page 151.

Also solved by the PROPOSER.

MECHANICS.

274. Proposed by G. B. M. ZERR.

A sphere moves on the concave side of a rough cylindrical surface of which the transverse section perpendicular to the generating lines is a hypocycloid. If $s = l \sin n\theta$ be the intrinsic equation of the hypocycloid, then $l = (a-b)4b/a$, $n = a/(a-2b)$, where a = radius of fixed circle, b = radius of rolling circle.

REMARK BY A. H. WILSON, Haverford College.

The statement of this problem is incomplete. As it stands it is not a problem at all.

275. Proposed by W. J. GREENSTREET, Editor of the Mathematical Gazette, England.

If a particle be attracted towards the angular points of a regular hexagon by forces equal to r^{-h}, at distance r, find the condition for stability of equilibrium.